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Drug Injection Practices Among High-Risk Youths: The First Shot of Ketamine

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ABSTRACT *Ketamine, a "club drug" commonly administered intranasally among youths for its disassociative properties, has emerged as a drug increasingly common among a new hidden population of injection drug users. Because of a scarcity of epidemiological data, little is known about ketamine injection practices, associated risk behaviors, or the demographic characteristics of ketamine injectors. Using an ethno-epidemiological methodology, we interviewed 40 young (<25 years old) ketamine injectors in New York during 2000–2002 and asked detailed questions about ketamine injection initiation as well as histories of other injection drug use and involvement in the street economy. Our analysis, utilizing descriptive statistics and narrative accounts, compared two groups: ketamine initiates (youths who initiated injection drug use with ketamine) and other initiates (youths who initiated injection drug use with another drug, such as heroin, and later transitioned into ketamine injection). Results indicated that intramuscular injections were more common among ketamine initiates, whereas intravenous injections were more common among other initiates. Drug form and local knowledge within injection groups were important factors underpinning this relationship: liquid ketamine was injected primarily intramuscularly; powder ketamine was injected primarily intravenously virtually irrespective of injection drug use history. In addition, the comparison between ketamine initiates and other initiates revealed differences regarding knowledge about injecting drugs; risk behaviors at initiation; involvement in the street economy, including homelessness and experience dealing drugs; and city or location of ketamine injection initiation. These findings suggest that ketamine injection is an emerging practice among a new hidden population of injection drug users in cities throughout North America.*

KEYWORDS *Ethnography, High-risk youth, Injection drug use, Ketamine, Street economy.*

> "K [ketamine] was the first drug I injected. I did it because I know K is clean—it's not like heroin, right. It comes from a lab, and it's inside a bottle. And it was a clean needle, and it's all clean. So I was like, "Fuck it, I'll do it." And it was in my muscle. Back then I was scared to do it in the vein. So I go ahead and did it in my muscle."
>
> 20-year-old Latino male

Ketamine injection has been identified as an increasingly common practice among a new hidden population of young injection drug users (IDUs).[1–3] Originally developed as a human anesthetic in the early 1960s, ketamine evolved into a recreational drug

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commonly sniffed in dance clubs beginning in the early 1980s.[4] A primary goal for many ketamine users is to experience a "k-hole," a slang term referring to the intense psychological and somatic state experienced while under the influence of ketamine. This state is more reliably achieved and intensely experienced by injecting the drug either intravenously or intramuscularly.[3] Because of a scarcity of epidemiological data on this emerging form of injection drug use, however, little is known about ketamine injection practices, associated risk behaviors, or the demographic characteristics of ketamine injectors.

In this article, we describe the first injection of ketamine among a small sample of youths actively involved in the street economy and ethnographic accounts and descriptive statistics derived from an ethno-epidemiological methodology.[5–7] In particular, we compared two groups of ketamine injectors based on first drug injected: youths who initiated injection drug use with ketamine (i.e., ketamine initiates) and youths who initiated injection drug use with another drug (i.e., other initiates). This analytical focus on drug type revealed variability in drug-using practices enacted at initiation and sources of local knowledge about risk behaviors and signals other important differences regarding youth involvement in the street economy.

Young IDUs are a vital population of injectors. Prior research indicates higher rates of human immunodeficiency virus (HIV) risk behavior among this group[8–11] and other high-risk characteristics, such as low high school graduation rates[12]; a history of jail, prison, or involvement in juvenile justice[13]; and a history of homelessness.[14] Although research on young injectors and injection initiation have highlighted important risk behaviors and trends among IDUs, several important limitations exist.

First, many studies on injection initiation do not specify the drug type injected at initiation or during the early part of an injector's drug-using career.[8,11,13,15,16] However, identifying the drug injected at initiation is an important part of understanding injection risk because different drug types are often associated with distinct injection practices[3,17,18] and because injection practices learned during initiation frequently become integrated into future injection drug-using events.[15] In addition, failing to identify drug type may decontexualize the injection event and decrease understanding of risk behavior given that different drugs are associated with diverse subpopulation of IDUs, such as men who have sex with men[6] and street youths.[3,14]

Second, virtually all of the current research examining the linkages between injection drug use and infectious diseases focuses on intravenous drug use as the principle type of high-risk injection behavior. Intramuscular and subcutaneous injections, however, represent other means of injecting illegal drugs and pose risks for the transmission of blood-borne pathogens.[19,20] During an intramuscular injection, a user inserts the needle's point into a muscle and directly injects the drug without attempting to "register" or draw blood into the syringe barrel. Similarly, subcutaneous injections, or "skin-popping," involve inserting the needle's point into the skin and injecting a drug into fat layers just below the skin. However, blood may unintentionally enter a needle's point or syringe barrel during either intramuscular or subcutaneous injections. For instance, the volume of blood transferred during intramuscular injections is typically three orders of magnitude less than that found in syringes used for intravenous injections.[21] The injection risks associated with intramuscular injections have received little research attention in comparison to intravenous injections.

Third, few studies on young IDUs described injection practices within the broader field of the "street economy,"[22,23] a domain of informal social and economic activity, including homelessness, drug dealing, sex work, stealing, and panhandling, that is often linked to high-risk behavior. However, studies of young IDUs[12–14,24] have reported important high-risk behaviors associated with paying for drugs or surviving on the streets, such as drug dealing, sex work, or thievery. Despite the fact that young IDUs are often homeless or engage in street survival strategies, research studies infrequently addressed the relationships among the street economy, injection drug use practices, and risk behaviors.

MEDICAL AND NONMEDICAL USES OF KETAMINE

Ketamine, a liquid pharmaceutical originally developed in the United States in 1962, was introduced in 1970 into general clinical usage[25] as physicians sought an easily administered anesthetic with few side effects. Ketamine is typically administrated in a single dose intramuscularly to perform minor procedures and may be administrated continuously using an intravenous route.[26] Variously labeled as "delirium," "psychotomimetic," "hallucinogenic," or "psychedelic" reactions, these states refer to alterations in mood, perception, thinking, body awareness, and self-control experienced during emergence from sedation that have been described as an "emergence effect."[27] Because of adverse side effects, ketamine has been used less frequently in standard medical settings since it was introduced in 1970. Apart from its use in human populations, ketamine's other primary medical use is as a veterinary anesthesia.[28]

The nonmedical use of ketamine extends back to the mid-1960s, soon after the drug was developed. Reports indicated that ketamine was distributed as early as 1967 by underground "medicinal chemists" to recreational users,[4] and by 1971, solutions of ketamine were being sold on the streets in Los Angeles and San Francisco.[29] As early as 1971, ketamine's abuse potential was noted.[30] Despite reports of ketamine being sold on the streets, the majority of nonmedical users during the early to mid-1970s tended to be experimentalists within the medical profession or educated individuals interested in exploring different states of consciousness.[4] However, by the late 1970s, the Food and Drug Administration released a report on ketamine abuse, and the National Institute on Drug Abuse published an article on ketamine intoxication that included profiles of sniffers and injectors.[29] These reports signaled a shift in the population of ketamine users from older experimentalists toward younger recreational users.

In the early 1980s, ketamine emerged as an important ingredient in the birth of the dance and rave culture in the United Kingdom and the United States among urban youths and young adults.[31] As the rave culture expanded during the late 1980s and early 1990s, reports of nonmedical ketamine use in conjunction with the rave culture began appearing in the research literature.[32,33] In 1999, following continued reports of the sale, theft, and abuse of ketamine, the Department of Enforcement Administration placed ketamine into schedule III of the Controlled Substance Act, making it illegal to possess ketamine for recreational or nonmedical purposes.

METHODS AND DEFINITIONS

This study represents an ethno-epidemiological approach to researching drug use and health.[5–7] An ethno-epidemiological approach combines traditional epidemiological concerns for "agent," "host," and "environment" with an ethnographic

focus on "meaning" and "context."[5] Typically, epidemiologists collect surveys or aggregate reported data to describe larger health trends; ethnographers write "thick descriptions" of localized practices and experiences among smaller groups of individuals. In this study, we combined the epistemological concerns, research methods, and reporting techniques from these two disciplines to describe ketamine injection and associated health risks.

This report is part of a two-phase study of ketamine injectors conducted in New York City between September 2000 and July 2002. The phase I data, which consisted of brief, exploratory interviews with ketamine injectors (n = 25), detailed injection practices and risk behaviors associated with the most recent injection of ketamine.[3] Eight youths (n = 8) from phase I were recruited into the phase II sample (n = 40). The findings reported in this article are based on the phase II data. Given the minimal overlap between the phase I and phase II samples, the data reported here largely represent new cases of ketamine injectors. In addition, the previously published findings[3] on the phase I data focused on the most recent injection of ketamine, whereas this article examines ketamine injection initiation or the first shot of ketamine.

The phase II data were gathered by the lead author, who used participant observation methods both to identify the settings where young drug users congregated and to develop rapport with injectors within these settings. More specifically, the author "hung around" three contiguous public settings that served as meeting points for homeless and other street-involved youths in Manhattan's East Village. Over a period of weeks and months, informal conversations about drug use and health helped to develop rapport with several groups of youths within these settings. This rapport served as a means to meet other youths, to ask basic questions about ketamine use, and to recruit a sample of ketamine injectors into the study.

To qualify for enrollment in the study, a young person had to meet two criteria: aged between 18 and 25 years and had ever injected ketamine. On meeting the criteria, we administered a tape-recorded, semistructured interview consisting of both open- and closed-ended questions that focused on the details of ketamine injection initiation, most recent ketamine injection, and history of ketamine and other injection drug use. Prior to being interviewed, all subjects signed a written consent form approved by an institutional review board, and each received $20 for participating in the study.

Following the interview, each transcript was transcribed and coded. Responses to closed-ended questions (e.g., "In what city did you first inject ketamine?") were coded and used to construct a series of descriptive variables, such city of ketamine initiation. Other closed-ended questions were similarly coded and utilized to generate frequencies on variables of interest across all 40 youths. Open-ended questions (e.g., "How did the first ketamine injection make you feel?") elicited detailed narrative responses from each injector that were analyzed, categorized, and counted. Throughout this study, we applied descriptive statistics to detail the larger patterns of ketamine use for the sample, and narrative accounts contextualize these patterns and relationships. However, because our sample was relatively small and nonrandom, we did not assess the statistical significance of these patterns. All of the data presented are based on 40 coded interview transcripts.

In this article, the phrase *ketamine injection initiation* refers to the events and practices that constituted an injector's first shot of ketamine. Our sample consisted of both new IDUs who initiated with ketamine, referred to as ketamine initiates, and experienced IDUs who initiated with a drug other than ketamine, referred to as other

initiates. Throughout the article, we contrast the demographic and behavior characteristics among ketamine initiates and other initiates. These comparisons represent the core of our analysis because they highlight significant features of ketamine injection initiation, including mode of administration, as well as subgroups of injectors.

SAMPLE DEMOGRAPHICS AND PRIOR DRUG-USING HISTORIES

The Table presents demographic characteristics for the total sample (N = 40) as well as for ketamine initiates (n = 23) and other initiates (n = 17) groups. Among the total sample, the median age at interview was 21 years old, with an age range of 18 to 25 years. Although the total sample was predominantly male, white, and heterosexual, it is notable that women and youths of color were represented in significant propor-

TABLE . Sample demographics

	Ketamine (n = 23)	*f*	Other (n = 17)	*f*	Total (n = 40)	*f*
Age at interview, years						
Median	20		21		21	
Range	18–25		18–25		18–25	
Gender, %						
Male	83	19	59	10	73	29
Female	17	4	41	7	28	11
Total*	100		100		100	
Race/ethnicity, %						
Caucasian/white	57	13	76	13	65	26
Latino/Hispanic	22	5	0	0	13	5
Biracial	17	4	18	3	18	7
Asian American	4	1	0	0	3	1
Native American	0	0	6	1	3	1
Total*	100		100		100	
Sexual identity, %						
Heterosexual	100	23	89	15	95	38
Bisexual	0	0	11	2	5	2
Total*	100		100		100	
Education, %						
High school grad/GED+	74	17	59	10	68	27
Homeless, %						
At interview	13	3	71	12	38	15
Ever	61	14	88	15	73	29
Lost parent, %						
Died/never known	22	5	29	5	25	10
Work status, %						
Panhandle	4	1	71	12	35	14
Sell drugs	30	7	18	3	25	10
Informal economy	30	7	12	2	23	9
Formal economy	22	5	0	0	13	5
Unemployed	13	3	0	0	8	3
Total*	100		100		100	
Ever Sold ketamine, %	83	19	35	6	63	25

* Totals may vary from 100% due to rounding.

tions. Over two thirds obtained a high school diploma, received a GED, or attended some college. Over one third were homeless at interview; nearly three quarters had been homeless during their lifetime. One quarter lost a parent (a parent died or was never known) during their lifetime. Over one third panhandled as a primary means of earning money. Selling drugs or participating in the informal economy, such as promoting concerts or making jewelry for off-the-books earnings, were also common sources of income. Participating in the formal economy, such as working as a waiter or stock person, was slightly more common than being unemployed. Hence, the majority of the sample were actively involved in the street economy at the time of interview.

Many youths in this sample shared certain drug-using histories that may have facilitated initiation into ketamine injection, such as sniffing ketamine, selling ketamine, or previous injection drug use. These findings mirror other research on IDUs, which indicated that prior drug-using histories, including selling drugs,[12] intranasal drug use,[34,35] or previous injection drug use,[35] are often associated with entry into injection initiation.

First, a majority of sampled youths (90%) had a history of sniffing ketamine prior to ketamine injection initiation. The median age at sniffing initiation was 17 years old. Many youths reported that regularly sniffing ketamine resulted in developing a tolerance to the drug, which in turn required greater quantities to achieve the same high. In addition, sniffing large amounts of ketamine caused blockage of the nasal passages, which some described as uncomfortable or painful. Compared to sniffing, injecting ketamine required less of the drug to achieve a more intense high and alleviated nasal or sinus problems.

Second, nearly two-thirds (63%) had a history of selling ketamine prior to injection initiation. Typically, selling ketamine required purchasing vials of liquid, pharmaceutically produced ketamine and transforming the liquid into a powder. Liquid ketamine was converted into a powder through a variety of techniques, including baking, steaming, microwaving, and air drying the drug. Ketamine was more typically sold in a powder form because it was easier to distribute and yielded greater profit, and most recreational users preferred sniffing rather than injecting the drug. Hence, a majority were familiar with ketamine in its liquid form prior to initiating ketamine injection based on drug-selling histories.

Third, over two-fifths initiated injection drug use intravenously with another drug prior to injecting ketamine for the first time. We refer to these youths who had prior experience injecting drugs as other initiates (n = 17) because they initiated injection drug use with a substance other than ketamine. Heroin was the most typical drug administered at injection initiation, followed by cocaine and morphine. In contrast, we refer to the majority of youths in the sample who initiated injection drug use with ketamine as ketamine initiates (n = 23).

KETAMINE INJECTION INITIATION: INTRAMUSCULAR VERSUS INTRAVENOUS

As we reported in our earlier work, ketamine is commonly injected both intramuscularly and intravenously.[3] In our current sample, nearly three quarters initiated ketamine injection intramuscularly compared to over one quarter who initiated ketamine injection intravenously. Hence, an intramuscular injection was the more preferred mode of administrating ketamine at initiation, but why?

An important characteristic of the sample is that it contains both youths with a history of intravenous injection drug use (other initiates) and those without any

prior history of injection drug use (ketamine initiates). Figure 1 depicts the relationship between first drug injected (ketamine vs. other) and mode of administration at initiation (intramuscular vs. intravenous) across the sample of 40 youths. In Figure 1, nearly all ketamine initiates injected ketamine intramuscularly; a majority of other initiates injected ketamine intravenously. Hence, new initiates to injection drug use almost exclusively injected ketamine intramuscularly; experienced injectors more typically injected intravenously. However, a large proportion of other initiates also initiated intramuscularly. To explain differences in mode of administration among these two groups, we begin with the accounts provided by other initiates, the group who initiated injection drug use prior to ketamine.

Other Initiates

Intravenous Injection Accounts As Fig. 1 exhibits, a majority of other initiates (n = 10) reported injecting ketamine intravenously at initiation. Among this group, half recounted injecting intravenously based on prior drug using experience or knowledge obtained from other networks of injectors. In other words, these youths recalled the techniques learned from injecting one drug, such as heroin or cocaine, and applied their knowledge about these practices to the administration of a new drug, as this 24-year-old white female indicated: "I injected in my vein because that's what I'd done before. I hadn't injected for a couple years, but I did it a few times, and that's where I did it [in the vein]." Or, as a 22-year-old Native American male simply stated: "We did it like H [heroin]."

Three youths indicated that they injected intravenously after watching others or having a person inject them, as this 22-year-old white male stated: "It was in my vein the first time I did it. I didn't really know if you were supposed to do it IM or IV. I had a clean syringe, and this guy mainlined [intravenously injected] it for me." This youth also indicated retrospectively that he was unaware of the possibility of

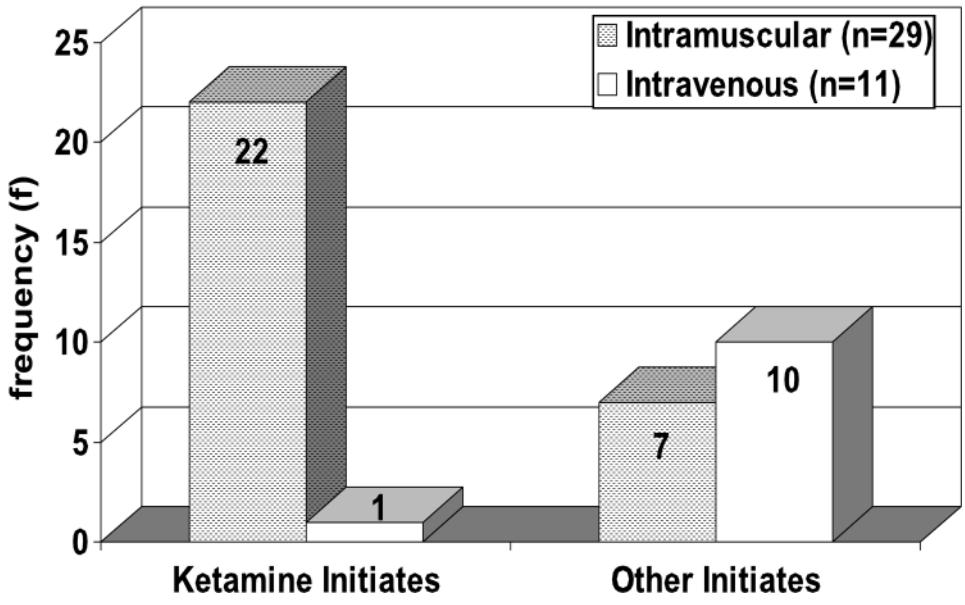

FIGURE 1. First drug injected and mode of administration (N = 40).

injecting ketamine intramuscularly at initiation. In addition, he learned to "mainline" ketamine based on the experience of someone in the injection group who administered the injection.

Similarly, a 21-year-old white male also reported that he injected intravenously at initiation, but was unfamiliar with the practice of injecting ketamine intramuscularly: "I didn't know then. I didn't muscle it. I mainlined it, and it was pretty crazy. It was powder form; they cooked it down, and it's powder. So, it wasn't as thick as liquid." Significantly, this youth reported that a member of the injection group "cooked" or converted liquid ketamine into powder. In this case, it may have been local knowledge or a common practice among his injection group to convert the liquid drug into powder form before injecting it intravenously. Interestingly, he is only 1 of 2 youths out of 40 injectors who mentioned drug form—powder versus liquid—as a consideration when explaining how he administered ketamine at initiation. However, despite the fact that very few injectors commented on drug form at initiation, we report that drug form appeared to be a factor associated with mode of administration.

Drug Form and Mode of Administration Figure 1 shows that a number of other initiates (n = 7) injected ketamine intramuscularly at initiation. This is an important finding because all other initiates had injected other drugs intravenously, such as heroin or cocaine, during their drug-using careers. So, why did these injectors initiate ketamine via an intramuscular mode given their experience injecting intravenously? Figure 2 selects other initiates (n = 17) and displays the relationship between drug form injected (powder vs. liquid ketamine) and mode of administration at ketamine initiation. Figure 2 depicts a notable pattern: All of the other initiates who had powder ketamine at initiation injected it intravenously. In contrast, most of the other initiates who had liquid ketamine at initiation injected the drug intramuscularly. Hence, all other initiates—when presented with powder ketamine at initiation—approached the drug like other powdered drugs previously administered, such as heroin or cocaine: They injected the powder intravenously.

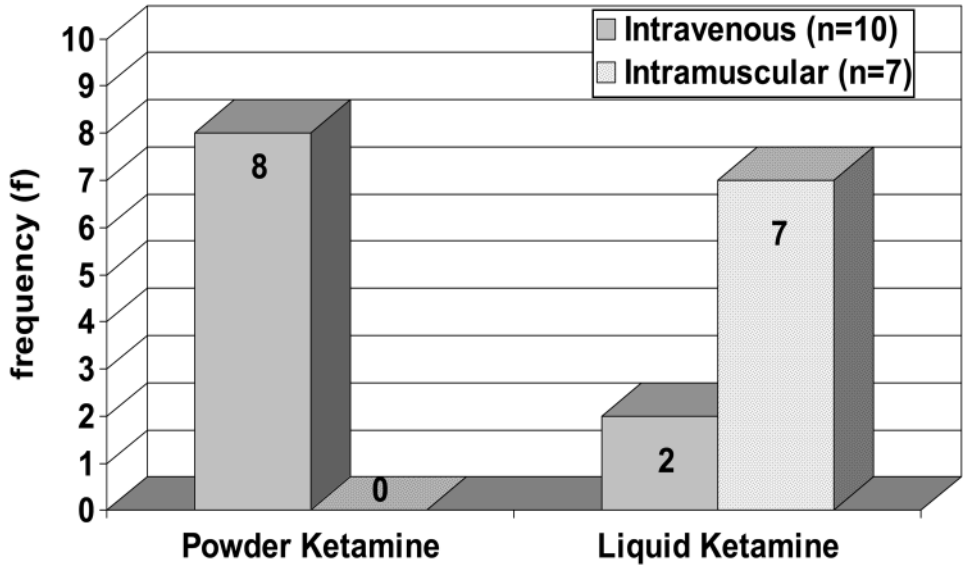

FIGURE 2. Drug form and mode among other initiates (n = 17).

The other initiates who injected liquid ketamine intramuscularly provided a broad range of rationales (some based in forethought and planning) as to why they injected in that manner. First, among this group, two youths indicated that they also injected intramuscularly based on contact with networks of other injectors who instructed them to inject intramuscularly or by watching a friend inject intramuscularly. Second, two youths suggested that their decision to inject intramuscularly was predicated on either the drug paraphernalia available at initiation or the drug form presented at initiation. For instance, a 19-year-old white male reported that his decision to inject intramuscularly was impacted by the fact that he obtained a syringe designed for intramuscular injections and by instructions he received from individuals within the injection group:

> I injected myself in a muscle. And, we had really big syringes, too. It wasn't a 1-cc syringe; it was like 5 cc and had a thick needle. They got the rigs [syringes] from the same place that they got the [vials of] K. They were telling me, "You can't use this in your vein; just do it in your muscle.

Also, a 21-year-old biracial female noted how the "thicker" quality of liquid ketamine (drug form) and advice from a friend in the injection group influenced her decision to inject intramuscularly at initiation:

> I injected in my muscle. My friend said it doesn't make much of a difference [intravenous vs. intramuscular]. Supposedly, ketamine is not more corrosive than heroin, but thicker, and it's easier to collapse a vein. And, I'm little, and I have really thin veins, so it would probably be safer. So, he [friend] said it would be safer to do that [intramuscular].

Interestingly, this young woman indicated that injecting intramuscularly was safer than injecting intravenously, but not because of risks for infectious diseases. Rather, she was concerned about the possibility of collapsing a vein and the potentially powerful effect of intravenously injecting the drug into her small body. Another youth, a 17-year-old white male, also expressed concern that injecting intravenously could be harmful, but not necessarily a disease risk: "[I injected] in the muscle. I would never do it in my vein because I've seen too much shit happen with that—kids' arms can get real swollen."

Last, two youths reported that they learned to inject ketamine intramuscularly by reading about the drug in books or on the Internet. An 18-year-old white male described how he first learned on the Internet about safely injecting heroin intravenously and subsequently used the same resource to learn about injecting ketamine intramuscularly:

> All of these people I knew were doing it [injecting heroin]. They were all like fucking junkies and just like shooting up constantly. Everybody goes, "That's horrible." Then, after I read about it [on the Internet], I learned it could be a safe thing if you know what you're doing. So, I looked it up and everything on the Internet. I didn't want to be stupid about it [injecting heroin]. . . . The first time I injected [ketamine], I did it in my shoulder. That's where they [Internet site] say it's the best place to do it.

Among all other initiates, only two youths did not conform to the previously described patterns of either intramuscularly injecting liquid ketamine or intravenously

injecting powder ketamine. This 22-year-old white male reported the circumstances surrounding his first injection of ketamine, injecting liquid ketamine intravenously:

> The first time I shot ketamine, I did it by myself on the street. I stumbled on a friend who gave me a whole six pack of licks [vials of ketamine], and I happened to have a needle because I was doing dope [heroin] at the time. And it was like, "Whoa, I want to come down from this was speedy, speedy, speedy X [MDMA] that I took earlier. So, I injected it in my vein. I never do a muscle; I heard they hurt. I heard they hurt like no tomorrow. So, I always do a vein, which hurts too.

Perhaps one of the most significant factors influencing his decision to inject intravenously—besides his belief that intramuscular injections were painful—was the fact that he initiated by himself or without the influence of an injection group. Because he was alone at initiation, he applied his own knowledge and experience about injecting drugs, which did not include injecting intramuscularly. Youths who initiated ketamine injection outside an injection group were uncommon: Only three persons initiated alone.

Ketamine Initiates

Intramuscular Injection Accounts Referring to Fig. 1, the graph indicates that nearly all of the ketamine initiates injected ketamine intramuscularly. Based on a tallying of the narrative accounts of these initiates, nearly two thirds indicated that they learned to inject ketamine intramuscularly via a network or injection group, either through watching a friend or by heeding a friend's instructions at initiation, as this 22-year-old white male indicated: "I did it in my arm muscle [shoulder] because everyone else does it that way. I just watched how someone else did it, and then I did it to myself."

In addition, this young man stated that he injected himself at initiation. Half of all ketamine intramuscular initiates self-injected at ketamine injection initiation. Compared to an intravenous injection, an intramuscular injection does not require finding a vein or drawing blood into a syringe. For a novice injector, an intramuscular injection maybe be easier to administer than an intravenous injection.

As suggested here, many youths were familiar with liquid ketamine based on their experience selling or sniffing the drug. In addition, this familiarity with the drug also exposed them to administration instructions located on the labeling and packaging of the vial, as this 25-year-old white male suggested: "Ketamine is not meant for intravenous injections. On the bottle it says it's meant for intramuscular injections for animals. It said 'intramuscular use only.' "

Two other youths also indicated that they chose to inject intramuscularly at initiation based on local knowledge indicating that ketamine was a "muscle drug." Third, another five youths indicated a direct concern for injecting ketamine intravenously based on the stigma, risks, or drug potency associated with an intravenous injection, as this 21-year-old biracial male reported:

> I injected in my muscle. I like to keep my veins good because I work out. It's easier that way than trying to inject it into your vein. Injecting it into your arm, you're taking a big risk; you can puncture a vein or miss it altogether. I'd rather just put it into the muscle, and it hits you slower, too.

Here, the young man's primary concern with an intravenous injection centered on harming a vein rather than becoming exposed to a blood-borne pathogen, such as HIV or hepatitis. Also, he indicated a desire to protect his arms from "track marks," which are injection drug use "stigmata." In addition, he rightly indicated that injecting ketamine in a muscle, rather than a vein, caused the drug to have an impact at a slower rate.

In sum, ketamine initiates offered three primary reasons for injecting ketamine intramuscularly: They learned to inject intramuscularly from networks of friends or injection groups, followed the instructions on the ketamine vial, or shied away from an intravenous administration because of negative factors associated with intravenous injections, such as increased risk, increased potency, or stigmata. However, in addition to these individual injector accounts, drug form (liquid ketamine) was also a factor associated with injecting intramuscularly among ketamine initiates.

Drug Form and Mode of Administration As described in the preceding section, the relationship between mode of administration and first drug injected among ketamine initiates depicted a clear pattern: Nearly all injected ketamine intramuscularly at initiation. For ketamine initiates (n = 23), Fig. 3 displays the relationship between drug form (powder vs. liquid ketamine) injected at ketamine initiation and mode of administration. Similarly, this figure indicates an important relationship between drug form and mode of administration: Nearly all ketamine initiates who obtained liquid ketamine injected the drug intramuscularly. Hence, as with other initiates, drug form may have an impact on mode of administration among ketamine initiates.

As Fig. 3 indicates, 2 youths did not conform to the pattern followed by 21 others. One youth, a 21-year-old Latino male, did not follow the trend of injecting liquid intramuscularly. Rather, he followed the lead of three individuals within the injection group at initiation and injected intravenously: "I injected [liquid] myself in my vein; that's what the others were doing."

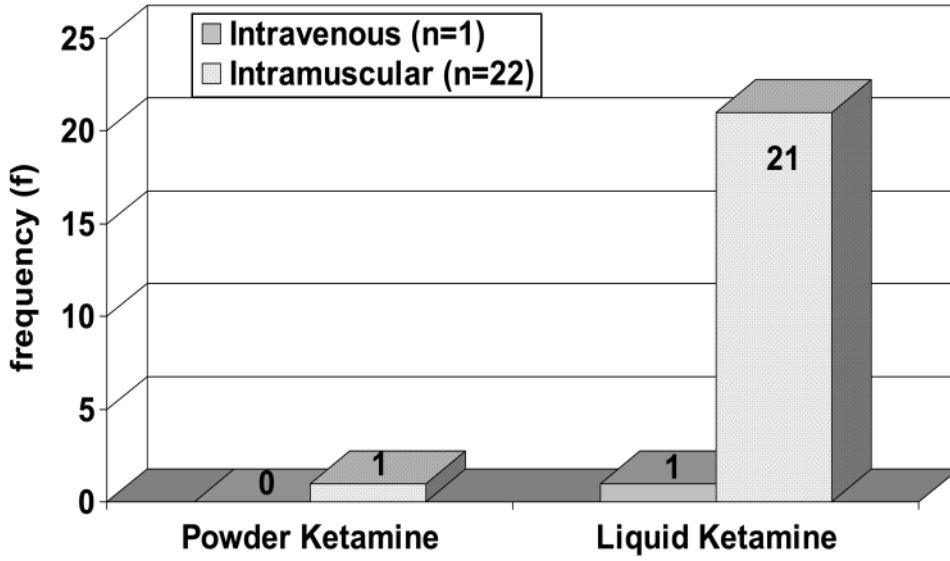

FIGURE 3. Drug form and mode among ketamine initiates (n = 23).

In addition, only one youth, an 18-year-old biracial male, obtained powder ketamine at initiation. All other ketamine initiates obtained liquid at initiation. As he described, he mirrored the injection practices of three persons in the injection group and injected the powder intramuscularly because of similar concerns about intravenous injections raised by other ketamine initiates: "I skin-popped. I was scared about the vein. I like to wear T-shirts, so I don't want track marks if you know what I'm saying. The others [injectors], three of them skin popped it; the rest of them were shooting in their vein."

Geography and First Drug Injected: Subgroups of Ketamine Injectors

In the previous sections, we described patterns of drug injection practices based on the relationships among drug form, first drug injected, and mode of administration at initiation. We now describe other drug-using patterns among this sample by examining the relationship between geographic location at ketamine injection initiation and important demographic and behavioral characteristics, particularly involvement in the street economy.

Nearly two thirds of all ketamine injection initiations occurred in the New York City area, which included New York City's five boroughs, suburban New Jersey, and Long Island. Significantly, ketamine initiations also occurred in other East Coast and Canadian cities, such as Toronto, Ontario, Canada; Baltimore, Maryland; and Philadelphia, Pennsylvania; southern cites such as Memphis, Tennessee, and New Orleans, Louisiana; and West Coast cities such as Los Angeles, California, and Seattle, Washington. Hence, although a majority of initiations happened in New York City, which is to be expected because the study recruited injectors in New York, youths obtained ketamine and injected the drug in cities across the United States and in Canada.

Figure 4 documents the relationship between first drug injected and geographic region where youths obtained and initiated ketamine injection (n = 40). Over four fifths of ketamine initiates initiated ketamine injection in New York City; nearly two thirds of other initiates injected in other North American cities. Hence, the majority of ketamine initiates started injection drug use with ketamine in New York City. In contrast, most of other initiates—those who initiated injected drug use with other drugs, such as heroin or cocaine—initiated ketamine injection outside New York. As we describe, the relationship between first drug injected and geographic location highlights differences among youths within the sample. In particular, to describe two subgroups of high-risk youths, we contrast the two largest subtypes of youths in the sample: ketamine initiates who initiated ketamine injection in New York (n = 20) and other initiates who initiated ketamine injection in another US city (n = 11).

Compared to ketamine initiates who injected in New York City, other initiates who injected in another US city were more likely to be female, white, had a parent die or never knew a parent, had been homeless at interview, supported self through panhandling, had a history of drug treatment, and had never dealt ketamine. Hence, apart from their status as IDUs, these other initiates were a more vulnerable and resource-poor group of youths. Among ketamine initiates, nearly two thirds had a history of homelessness, and three quarters were either unemployed or supporting themselves by selling drugs or participating in the informal economy. In addition, as a result of selling the drug, ketamine initiates were more familiar with the various forms of the drug and had greater access to liquid ketamine. Hence, each subgroup had different types of involvement in the street economy prior to ketamine initiation: other initiates were more likely to be homeless and panhandle; ketamine initiates were more likely to have sold ketamine.

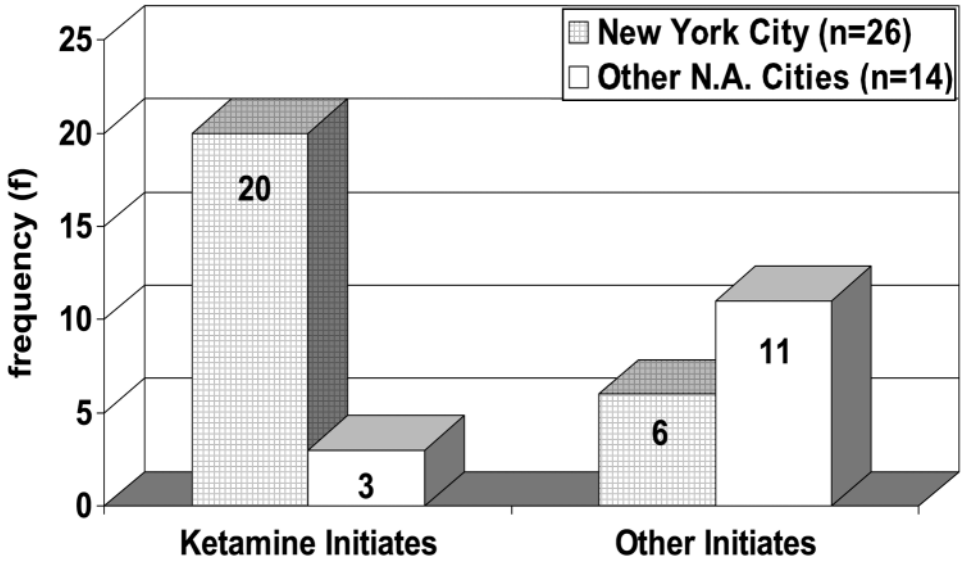

FIGURE 4. First drug injected and geography at initiation (N = 40) (N.A., North American).

At ketamine injection initiation, other initiates were more likely to have been 18 years or older; been using another drug, including alcohol; received ketamine for free; obtained a syringe from a needle exchange; initiated in a public space; injected powder ketamine; injected intravenously; injected multiple shots of ketamine; and shared a cooker or vial. There was no difference between groups among youths who self-injected. As these summary descriptions suggest, other initiates were older, more experienced, and polydrug-using injectors who had less access to private spaces to inject and tended to engage in higher risk behaviors. The fact that the majority injected powder intravenously reflects a somewhat weaker connection to local supplies of ketamine and demonstrates different sources of knowledge about ketamine injection practices. In contrast, ketamine initiates were much more likely to inject liquid ketamine intramuscularly, which indicated other knowledge about injection practices and greater access to ketamine.

In sum, youths who initiated ketamine injection outside New York were often mobile, homeless IDUs who had few material resources or access to liquid ketamine in their city of initiation. Rather, ketamine injection initiation was a spontaneous event, often occurring in the context of other injection drug use, that bore little or no direct financial costs to the injector. In contrast, youths who initiated ketamine injection in New York City were typically younger, less-mobile, novice IDUs who had more resources and who often had connections to sources of ketamine. Among these youths, ketamine injection initiation was an extension of their participation in the larger street economy within New York City, particularly those facets that involved buying and selling ketamine.

DISCUSSION

We began this article with the narrative account of a young man—an explanation of why he injected ketamine for the first time—which introduced many of the themes addressed in this article: drug injected at initiation, mode of administration,

and drug form. He also raised the theme of cleanliness as a reason underpinning initiation ("clean" drug and "clean" needle), a factor echoed by others. The perceived cleanliness associated with ketamine persuaded many injectors, particularly ketamine initiates, to make the following general distinctions between injecting ketamine and other more stigmatized drugs: ketamine is not a street drug like heroin or cocaine because it is manufactured by pharmaceutical companies and is packaged in sterile vials; ketamine injectors are not "junkies" because the drug is administered intramuscularly, which does not leave track marks; and ketamine injectors do not have to obtain syringes from stigmatized locations, like needle exchanges, but can buy clean syringes themselves from a pharmacy. These seemingly commonsensical distinctions between ketamine and other drugs, which offer compelling reasons why many youths in this sample initiated injection drug use with ketamine, heighten the significance of viewing ketamine injection as an evolving practice and emerging, hidden phenomena among high-risk youths.

We described demographic and behavioral differences among two groups of ketamine injectors, ketamine initiates and other initiates. We detailed a pattern that linked drug form and mode of administration at ketamine initiation: Liquid ketamine was injected primarily intramuscularly, and powder ketamine was injected primarily intravenously virtually irrespective of injection drug use history. In addition, the narrative accounts revealed that local knowledge within injection groups constituted another important factor with an impact on decisions about methods of administrating ketamine at initiation. These last findings corroborate other research on IDUs that point to the significant influence of injection groups and social networks on injection practices and risk behavior.[36–39]

Also, we indicated that different geographic locations at ketamine injection initiation revealed subgroup distinctions surrounding injection practices and involvement in the street economy: Other initiates who initiated in other US cities were more likely to be homeless and transient compared to ketamine initiates initiating in New York, who had more resources and were less mobile. Furthermore, our findings suggest that involvement in the different aspects of the street economy may have offered young IDUs access to different supplies and forms of ketamine, such as powder versus liquid, and exposed them to dissimilar injection groups and kinds of knowledge about injection practices, such as intravenous versus intramuscular modes of administration.

The findings on drug form (liquid vs. powder ketamine) mirror prior research indicating that drug form may be linked to particular geographic regions and local injection practices.[17,18] For instance, research on heroin injectors in Denver, Colorado, and New York demonstrated that Denver injectors typically obtained tar heroin and heated cookers for longer periods, whereas New York injectors more commonly acquired powder heroin and heated cookers for shorter periods or not at all.[17] Research on crack injectors in Bridgeport, Connecticut, and New York revealed that Bridgeport injectors more typically transformed crack into an injectable solution using vinegar (acetic acid), whereas New York injectors more often used lemon juice (citric acid).[18] Both studies highlight how geography may have an impact on drug markets and drug form and how local knowledge and innovative drug preparation practices among injectors and within groups may affect risks for the transmission of blood-borne pathogens. Similarly, our current research on ketamine further demonstrates the importance of examining injection practices and risk behaviors through the prism of drug type, drug form, and geography.

The narrative accounts provided by ketamine initiates and other initiates revealed diverse sources of local knowledge concerning how to inject at initiation. A high proportion of ketamine initiates—nearly 50%—self-injected at initiation, which indicated prior knowledge of injection practices via social networks, such as observing others inject, hearing others describe how to inject, or educating oneself about injecting through diverse knowledge sources, such as the Internet and instruction labels on vials of ketamine. This is a relatively high proportion of self-initiates compared to other studies on injection initiation, which found that new IDUs self-injected less than 18% of the time,[12,24,40,41] although rates as high as 27% have been reported.[14] Injection practices enacted at initiation are particularly significant because IDUs who learn protective practices, such as learning to self-inject, are less likely to seroconvert during their injection career.[40]

In addition, the narrative accounts of how youths injected intramuscularly or intravenously highlighted different types of knowledge surrounding the risks associated with injection drug use. The knowledge of risks coupled with intravenous injections, for instance, often focused on concerns other than HIV or hepatitis. Rather, youths spoke of risks such as swollen arms, punctured veins, collapsed veins, or track marks and the potency of intravenous injections. The variable knowledge of injection risk contained in these accounts is corroborated by the behavioral data reported here and elsewhere[42] on risk practices at initiation: Few youths shared a syringe; a majority shared vials of ketamine or cookers at initiation. Hence, ketamine injectors should be targeted for risk reduction messages concerning the sharing of injection paraphernalia. However, it is significant that a majority of the youths in this sample—primarily ketamine initiates—would not be reached by existing sources of harm reduction information, such as needle exchanges, which primarily target heroin injectors.

Last, applying an ethno-epidemiological methodology to the study of ketamine injection initiation revealed several new findings on injection practices, sources of knowledge about initiation, characteristics of ketamine injectors, and ketamine injection groups. However, we should advise that these results were based on a sample of 40 young injectors from one diverse neighborhood in New York City. To develop a broader epidemiological understanding of ketamine injection practices and risk behaviors, future ethnographic studies should focus on other important IDU subpopulations, such as women, youths of color, or men who have sex with men, as well as collect data in multiple cities or research sites. Such an ethno-epidemiological approach that both investigates important high-risk populations in depth and broadens the study scope to other cities should continue to yield new results while increasing the generalizability of the findings.

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